Short Report

Journal of Infection Prevention

Journal of Infection Prevention
2022, Vol. 23(3): 125–127
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DOI: 10.1177/17571774211066773
jip.sagepub.com
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A COVID-19 outbreak in a long-term care facility in Massachusetts: Rapidity and extent of spread, resident symptoms, and mortality

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Abstract

In the spring of 2020, COVID-19 spread rapidly through a long-term care facility in Massachusetts. 74 (of 134 total) residents tested positive, with 72 testing positive in the first three weeks of the outbreak. Fatigue, anorexia, myalgia, and confusion were the most common symptoms. 21 residents (28%) testing positive subsequently died.

Keywords

Covid-19, outbreak, symptoms, mortality, long term care facility

Introduction

On March 24, 2020, a long-term care (LTC) facility in Massachusetts received its first positive COVID-19 test result. The facility immediately required staff to wear personal protective equipment, cohorted patients based on suspected or confirmed COVID-19 status, and implemented other infection control measures based on guidance from the Massachusetts Department of Public Health, the Centers for Disease Control, and Centers for Medicare and Medicaid Services (Centers for Medicare and Medicaid Services, 2020a, 2020b). Doors were closed to visitors on March 14 in accordance with state and federal recommendations. Two weeks after the first positive result, over half the residents had tested positive for COVID-19. This report describes resident and staff COVID-19 testing status and dates of positivity, resident symptoms, and mortality over the course of the outbreak.

Case report

Late on March 18, a resident presented with fatigue, anorexia, cough, and shortness of breath. Exam revealed use of accessory muscles of respiration, diminished lung sounds, oxygen saturation of 95% on 2 L of oxygen, and a temperature of 99.7°F. After a negative influenza test, the resident received a nasopharyngeal swab on March 19 to test for SARS-CoV-2 by real-time reverse-transcriptase polymerase chain reaction (RT-PCR). On March 24, the facility received a positive result. The resident remained afebrile with respiratory difficulties throughout the symptomatic period and ultimately recovered.

Methods

The Berkshire Medical Center Institutional Review Board determined this study to be exempt research.

Setting

A 145-bed LTC facility with three nursing units: LTC, post-acute short-term care, and memory care. The study period encompasses the recognized start of the outbreak defined as the date of the first positive result, March 24, to the date of clinical resolution of the final case representing the outbreak, June 18.

Laboratory testing

SARS-CoV-2 RT-PCR: A nasopharyngeal swab submitted in a viral transport tube to Quest Diagnostics Laboratory or Massachusetts State Laboratory Institute.

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Table 1. Age, sex, and testing status of residents and employees.

Characteristic	Residents (*N* = 134)	Employees (*N* = 160)	Total (*N* = 294)
Age (mean ± SD)	82 ± 12.3	44 ± 14.1	61 ± 23.1
Sex—no. (%)			
Female	92 (68.7)	n/a	n/a
Male	42 (31.3)	n/a	n/a
RT-PCR—no. (%)			
Negative	53 (39.6)	134 (83.8)	187 (63.6)
Positive	74 (55.2)	20 (12.5)	94 (32.0)
Not tested	7 (5.2)	6 (3.8)	13 (4.4)

Table 2. Symptoms and mortality of COVID-19 residents.

Characteristic	Confirmed COVID-19 residents (*N* = 74)
Symptomatic—no. (%)	
No	28 (37.8)
Yes	46 (62.2)
Fatigue	30 (65.2)
Anorexia	18 (39.1)
Myalgia	13 (28.3)
Confusion	11 (23.9)
Cough	9 (19.6)
Fever ≥100.3 °F	8 (17.4)
Headache	7 (15.2)
Increased tremor	5 (10.9)
Sore throat	5 (10.9)
Shortness of breath	4 (8.7)
Died—no. (%)	
No	53 (71.6)
Yes	21 (28.4)

Data collection

Residents were included in the study if they resided in the facility at the start of the outbreak. Employees were included if they were employed by the facility at any point during the study period. Subsequent retrospective medical record review was completed for residents meeting inclusion criteria. We recorded resident age, sex, RT-PCR test date and results, symptoms, and survival status. Age and RT-PCR test results were also recorded for employees meeting inclusion criteria. The RT-PCR testing data collected represent a combination of individual and surveillance testing. Individual tests were conducted throughout the study period on the basis of clinical judgment for symptomatic residents. On April 6 and May 22, surveillance testing of all residents was performed. Employees were surveillance tested on April 15 and May 22.

Results

The mean age and sex of residents, age of employees, and test positivity rates for residents and employees during the outbreak are listed in Table 1. Employee sex data were not collected. Seven residents were not tested because they had been discharged from the facility or had died prior to surveillance testing. Six employees were not tested because their employment had ended prior to employee surveillance testing.

On March 19, the first positive RT-PCR swab was collected, and the result was reported on March 24. Between March 24 and April 5, 49 more positive cases were identified. On April 6, when all the residents were tested, 22 more first-time positive RT-PCR results were obtained. The second to last first-time positive swab was collected on April 17 and the last was collected on May 22, marking the end of confirmed spread of the virus among residents within the facility.

The clinical presentation of the 74 residents with COVID-19, including symptomatic rates, specific symptoms, and mortality rate, is depicted in Table 2.

Discussion

This report of a COVID-19 outbreak demonstrates the rapidity, extent of spread, and mortality among residents of an LTC facility. Within the first 19 days of the outbreak, 72 of the 74 resident cases were identified. 28% of infected residents died. Potential factors contributing to rapid spread include limited availability and narrow criteria for testing, pre-/asymptomatic spread, and prolonged turnaround time of test results (CDC, 2020a; Kimball et al., 2020). On March 16, three days before the index case was tested, symptoms appeared in several residents displaying poor oral intake, confusion, weakness, body aches, syncope, falls, sore throat, and headache. None of these residents met testing criteria, so no tests were administered (CDC, 2020a). In addition, best practices for isolating and cohorting residents and for limiting staff-resident exposure were not yet well-established, leading to the potential for spread (CDC, 2020b, 2020c).

While the percentage of employees with COVID-19 was comparatively small (12.5%), we include their test results here to illuminate disease prevalence in this group. Previous research has demonstrated a link between community spread and LTC resident mortality (Barnett et al., 2020). The first positive COVID-19 case in Massachusetts was confirmed on March 7 in a community-dwelling individual in the same county as the LTC facility studied here (Allen et al.,2020). While analysis of community spread is outside the report's scope, it was felt initial introduction of the virus into the facility by an employee is likely.

This investigation is the first we are aware of reporting symptoms of LTC residents with COVID-19. Previously identified common signs and symptoms in the general population include fever, cough, and shortness of breath (Zhu et al., 2020). In this study, fatigue, anorexia, myalgia,

and confusion were observed more frequently than the aforementioned common symptoms. It is possible that COVID-19 manifests differently in the elderly (Ward et al., 2020). Such disease features of COVID-19 in geriatric populations have implications for evaluation, for example, modifying testing criteria; and for treatment, for example, managing anorexia with IV fluids or addressing confusion with medication deprescribing. Further research with structured symptom scoring in LTC facilities might add to the current state of knowledge.

The study had several limitations. Limited availability of testing and the imperfect performance of the tests presented difficulties in depicting the exact dynamics and rapidity of the disease spread. The study relied on retrospective record review, so symptoms may have been under- or misreported, especially for residents with cognitive impairment. The focus was narrow; thus comorbidities, other patient-level factors, and mechanisms of spread into and within the facility were not analyzed.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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